Claims

[c1] 1.A system for controlling an electric motor in a motor vehicle, comprising:
at least one controller for receiving and processing a plurality of system input signals;
a first strategy embodied within the at least one controller for determining a maximum energy amount that can be put into the motor before the temperature of the motor is caused to rise to a maximum allowable temperature;
a second strategy embodied within the at least one controller for determining a motor power assist value that the motor can provide in a predetermined time period before the motor reaches said maximum allowable temperature; and
means for outputting said motor power assist value to a vehicle system controller.

[c2] 2.The system according to claim 1, wherein said system further comprises:
a third strategy embodied within said at least one controller for determining a battery power assist value;
a fourth strategy embodied within said at least one controller for determining a maximum power assist value that is the minimum of said motor power assist value and said battery power assist value; and
a means for outputting said maximum power assist value to said vehicle system controller.

[c3] 3.The system according to claim 2, wherein said system further comprises:
a fifth strategy embodied within the at least one controller for comparing said maximum power assist value to a driver demand signal; and
means for outputting a minimum of said maximum power assist value and said driver demand signal to said vehicle system controller.

[c4] 4.The system according to claim 2, wherein said system further comprises means for outputting said maximum power assist value to a power assist gauge.

[c5] 5.The system according to claim 2, wherein said battery power assist value is

based on a battery state of charge signal.

[c6] 6.The system according to claim 1, wherein said system inputs comprise:

ambient air temperature;

motor temperature; and

motor speed.

[c7] 7.The system according to claim 6, wherein said motor temperature comprises a stator copper temperature.

[c8] 8.The system according to claim 1, wherein said predetermined time period is about 10 seconds.

[c9] 9.The system according to claim 1, wherein said predetermined time period is based on vehicle operating conditions.

[c10] 10.The system according to claim 1, wherein said first strategy comprises a strategy for calculating the temperature of a plurality of motor components as a function of time using heat transfer determinations.

[c11] 11.The system according to claim 10, wherein said plurality of motor components comprises:

motor stator copper; and

motor stator iron.

[c12] 12.The system according to claim 1, wherein said second strategy uses a look up table to determine said motor power assist value.

[c13] 13.The system according to claim 12, wherein said look up table contains data referencing at least one of said plurality of system input signals and said maximum energy amount.

[c14] 14.A method for controlling an electric motor in an hybrid electric vehicle, comprising the steps of:

monitoring and processing a plurality of system input signals;

determining a maximum energy amount that can be put into the motor before the temperature of the motor rises to a maximum allowable

temperature; and

determining a motor power assist value that the motor can provide in a predetermined period of time before the motor temperature rises to said maximum allowable temperature.

[c15] 15.The method according to claim 14, further comprising the step of outputting said motor power assist value to a vehicle system controller.

[c16] 16.The method according to claim 14, further comprising the steps of:

determining a battery power assist value; and

determining a maximum power assist value that is the minimum of said motor power assist value and said battery power assist value.

[c17] 17.The method according to claim 16, wherein said step of determining a battery power assist value comprises the step of deriving said battery power assist value from a battery state of charge signal.

[c18] 18.The method according to claim 16, further comprising the step of outputting said maximum power assist value to the vehicle system controller.

[c19] 19.The method according to claim 16, further comprising the step of outputting said maximum power assist value to a power assist gauge.

[c20] 20.The method according to claim 16, further comprising the steps of:

comparing said maximum power assist value to a driver demand signal; and

outputting a minimum of said maximum power assist value and said driver demand signal to the vehicle system controller.

[c21] 21.The method according to claim 14, wherein said step of monitoring and processing a plurality of system inputs comprises the steps of:

monitoring and processing a signal for ambient air temperature;

monitoring and processing at least one signal for motor temperature; and

monitoring and processing a signal for motor speed.

[c22] 22.The method according to claim 21, wherein said step of monitoring and processing at least one signal for motor temperature comprises the step of

monitoring and processing a signal for motor stator copper temperature.

[c23] 23.The method according to claim 14, wherein said step of determining a maximum energy amount that can be put into the motor before the motor reaches a maximum allowable temperature comprises the step of calculating the temperature of a plurality of motor components as a function of time using heat transfer determinations.

[c24] 24.The method according to claim 23, wherein said plurality of motor components comprises:

motor stator copper; and

motor stator iron.

[c25] 25.The method according to claim 14, wherein said step of determining a motor power assist value that the motor can provide in a predetermined period of time before the motor temperature reaches said maximum allowable temperature comprises the step of determining said motor power assist value using a look up table.

[c26] 26.The method according to claim 25, wherein said look up table contains data referencing said at least one of said plurality of system input signals and said maximum energy amount.

[c27] 27.The method according to claim 14, wherein said predetermined time period is about 10 seconds.

[c28] 28.The method according to claim 14, wherein said predetermined time period is based on vehicle operating conditions.

[c29] 29.An article of manufacture, comprising:

a computer readable storage device; and

a plurality of strategies in computer readable format embodied in said computer readable storage device for directing a computer to control the steps of monitoring and processing a plurality of system input signals, said strategies comprising

a determination of a maximum energy amount that can be put into

an electric motor before the temperature of the motor rises to a maximum allowable temperature,

a determination of a motor power assist value that the motor can provide in a predetermined period of time before the motor reaches said maximum allowable temperature, determining a battery power assist value,

a determination of a maximum power assist value that is the minimum of said motor power assist value and said battery power assist value, comparing said maximum power assist value to a driver demand signal, and

an output of a minimum of said maximum power assist value and said driver demand signal to a vehicle system controller.

[c30] 30.A vehicle, comprising:

a computer readable storage device; and

a plurality of strategies in computer readable format embodied in said computer readable storage device for directing a computer to control the steps of monitoring and processing a plurality of system input signals, said strategies comprising

a determination of a maximum energy amount that can be put into an electric motor before the temperature of the motor rises to a maximum allowable temperature,

a determination of a motor power assist value the motor can provide in a predetermined period of time before the motor temperature reaches said maximum allowable temperature, determining a battery power assist value,

a determination of a maximum power assist value that is the minimum of said motor power assist value and said battery power assist value, comparing said maximum power assist value to a driver demand signal, and

an output of a minimum of said maximum power assist value and said driver demand signal to a vehicle system controller.